

DATE/TIME	February 14, 2011 9:00 a.m. – 4:00 p.m.
LOCATION	The Westin Grand, Symphony Room 433 Robson Street, Vancouver, B.C.
TYPE OF MEETING	Regular meeting of the BC Hydro Integrated Resource Plan (IRP) Technical Advisory Committee (TAC). TAC is a group of knowledgeable participants with significant interest, stake, and experience in BC Hydro's resource planning process assembled to provide detailed, technical input and feedback to BC Hydro during the development of the IRP.
FACILITATOR	Anne Wilson, BC Hydro
PRESENTERS	Kathy Lee, BC Hydro John Rich, BC Hydro Basil Stumborg, BC Hydro
ATTENDEES TECHNICAL ADVISORY COMMITTEE MEMBERS	Bill Andrews, BC Sustainable Energy Association David Bennett, Fortis BC David Craig, Commercial Energy Consumers Robert Duncan, First Nations Representative Derek Griffin, Ministry of Energy Matt Horne, Pembina Institute Loch McLannett, Clean Energy BC Andrew McLaren, First Nations Energy and Mining Council Randy Reimann, BC Hydro Richard Stout, Association of Major Power Consumers Mark Thomas, BC Utilities Commission Lori Winstanley, COPE Local 378 (morning session only)
MEETING OBSERVERS	Nicholas Heap, CANWEA Joe Mazza, Terasen Gas Jim Weimar, Weimar Consulting Inc.
ATTENDEES BC HYDRO	John Duffy Kenna Hoskins Dave Ince Patrice Rother Charlie Weiler  Susan Campbell, Recording Secretary, Kirk and Co.

### PRE-READING MATERIAL / HANDOUTS / PRESENTATIONS

- Agenda for TAC Meeting #3
- 2011 IRP Technical Advisory Committee Meeting #2 Presentation Slides – for the completion of the slide presentation (slides 141 – 155) from IRP TAC meeting #2
- IRP Technical Advisory Committee Revised Terms of Reference
- Summary Brief – Electrification of the Horn River Basin
- Slide presentation – Fort Nelson / Horn River Basin
- IRP TAC Members Areas of Interest
- Members Information Requests / Areas of Interest – Matrix - January 2011

### 1. WELCOME, AGENDA REVIEW AND ADMINISTRATION – Anne Wilson, Facilitator

The Facilitator welcomed everyone and reviewed the agenda for the meeting.

#### **INTRODUCTIONS**

TAC was introduced to Joe Mazza, from FortisBC, Director of the Transmission Group, a new observer to the process.

It was also confirmed that **Peter Ostergaard** is the Ministry of Energy representative member on the TAC.

#### **REVISED TERMS OF REFERENCE**

The Technical Advisory Committee's revised Terms of Reference were confirmed.

#### **FEEDBACK AND COMMENTS ON IRP INPUTS**

As was discussed at the conclusion of the meeting on January 28, 2011, this TAC meeting (February 14) was added to provide further opportunity for feedback and discussion with respect to the IRP inputs presented at the last meeting held on January 27 & 28.

Questions posed to TAC are:

- Are these inputs appropriate?
- Have factors been missed or misrepresented?

BC Hydro noted that work is advancing quickly and accordingly it was important to hear comments and views about the scenarios in a timely manner so that there is some ability to make adjustments where adjustments can be made.

Prior to the start of the discussion participants were asked to self select discussion items of interest from the list of the previous meeting agenda items so that TAC could focus on those items of greatest interest to the members. Items of greatest interest were market scenarios, DSM options and associated risk assessment, electrification, economic development indicators, exports, and portfolio analysis.

### 2. RISK FRAMEWORK: GAP AND MARKET SCENARIOS – Basil Stumborg

Basil opened the discussion by providing a brief summary of the risk framework discussion from the last meeting. The risk framework in the last LTAP established market scenarios which used three views of the world in a probability tree to test policy. In this IRP there are more variables to capture which poses challenges regarding portfolio modelling. The market scenarios are the attempt to capture uncertainty and bring this uncertainty into the portfolio modelling environment. Consistency is important and the market scenarios attempted to provide a consistent approach.

#### **Member comments regarding the current five market price scenarios used in the IRP analysis**

- A member suggested that BC Hydro should start out with describing these five scenarios first as they are the five conceptual things that people will look at and reassure themselves or disagree as to whether they are realistic. They currently are not described in a way that is easy to understand.
- There was a suggestion that perhaps a narrative summary would help to make these scenarios clearer.
- BC Hydro agreed and responded that the idea was to pick internally consistent ranges and when BC Hydro buys resources markets are considered it is hoped the five scenarios would adequately stress the modeling.
- A member thought a high growth-low commodity scenario is missing and Hydro should take a look at that possible situation.
- A member expressed concern that the way the scenarios were portrayed as ‘views of the way the world can unfold’ is too encompassing and suggested that a more accurate description of what they are is warranted.
  - BC Hydro responded in agreement, the idea was not to be exhaustive or meant to state that everything has been captured. BC Hydro is trying to stress a range of variables.
- A member commented that BC Hydro is working with four variables and can be thought of as combinations of highs and lows, and they encourage BC Hydro to look back on these and do a check that something hasn’t been missed in the combinations chosen.
- A member commented on the need to look at the actions that are coming out of the analysis and ultimately there are high priced resources and do high priced resources get built because the forecasted load might not show up. There is a concern in building resources that will cause B.C. not to be as competitive.
- A member made a comment that how the scenarios are communicated is important; there is not just one path but rather a number of paths that may move towards a particular scenario. There was a suggestion not to limit it to one description.

#### **ACTION ITEM(S)**

- BC Hydro to look at a high growth-low commodity situation.
- BC Hydro to consider how to better communicate the market scenarios:
  - in terms of being more specific in the description (what it is and what it is not); and
  - improving on how they are communicated/described to make them easier to understand.

### **Member comments regarding other ‘game changer’ scenarios missed**

- A member commented that there are external variables that haven’t been considered in BC Hydro’s scenario approach - for example, important variables are around policy and internal uncertainties and risks.
- Currently the five scenarios, rather than being 5 different worlds, are really one perspective as opposed to integrated sets of where the world may go. Essentially these are static assumptions of the basic environment with the exception of electrification. This member would like to see other policy changes considered. BC Hydro must have that conversation with government, and look at the game changing items.
- A member commented that BC Hydro has chosen a game changing scenario with electrification but there are several other critical things that will make huge differences in the future.
- For example, there might be various things on the rate side that might change load forecast and other outcomes. Some have been modelled in the DSM but there are a variety of things that would have dramatic consequences on the forecast, flexibility etc.
- Other kinds of changes include technology change, and social cultural changes. Technology change particularly important. There are potentially different scenarios.
- One member suggested that with these, “game changers” there may be a way to qualitatively describe modeling constraints and build in discussion about activities regarding adaptive to tools that could be used. BC Hydro needs to be clear on the limitations of the modeling exercise and be clear on the tools used. If “game changers” comes along what actions would BC Hydro take, for example, what could BC Hydro do in advance of the game changer to shorten the time lines?
  - BC Hydro response that partly this is what BC Hydro is trying to do with electrification and sensitivity tasks. With the electrification, BC Hydro is looking at what is new on the horizon and really trying to do sensitivity analysis around that.
- One member suggested another scenario regarding technology and policy is what if carbon sequestration was figured out and there were low gas prices. Remember that five years ago shale gas was not considered. Carbon sequestration seems like a solvable problem.
- Possible scenario examples include distributed generation, carbon capture, dramatic change to hydro rates; things that would change the four price cuts but the TAC Member is looking for something more than adding a fifth price stream.
- The member commented that there may be major stresses on, for example, the economy and electricity prices doubling in the next 10-years and government changing policy and that may change what is being modeled now. BC Hydro hasn’t looked at policy sets that may change in the next 10-years.
- A member recognizes and accepts that BC Hydro needs to work within the policy scenarios set out with the Clean Energy Act.

### **Member Comments regarding the need to create future flexibility**

- A member commented that currently BC Hydro is treating resources (DSM) as fixed block items, and there are actions BC Hydro should be taking to prepare and create future flexibility; such as, securing right-of-ways because that will give BC Hydro ability to move on short notice. Flexibility is key.
- A member commented that technology may influence what will happen in B.C., for example, distributed generation could completely change the perspective in resource planning. Site C is a big commitment and what kinds of changes such as technology changes may make Site C a poor investment? There will be lots of change that will come in a 10-15 year timeframe that will be a complete game changer; what is the best way to proceed forward given that variability is there – and the member posed the question as to how will BC Hydro go about making decisions and commitments?
- A member had a suggestion that perhaps BC Hydro could qualitatively talk about actions that BC Hydro would take to mitigate this future variability. The discussion could include different ways to meet demand and the risks associated with different possibilities.

- BC Hydro mentioned struggling with the mechanics of modeling versus what needs to be done overall. People are challenged with trying to compartmentalize options. There is a desire to test the plans for a number of factors coming down the road. However, unsure what the plan can ultimately be able to address. If distributed generation happens in big way what are the implications? There was a suggestion to establish a subgroup to contemplate the events that should be addressed in the IRP and document. BC Hydro is not in a position to model alternative policy but within policy margins there could be some accommodation.

### **ACTION ITEM(S)**

- A TAC subgroup was established to explore broader game changer scenarios using a qualitative assessment approach. Anne will send out a few possible dates for the subgroup to meet.

### **Member comments regarding Site C**

- A member questioned which costs were going to be used for Site C - and noted the difference it will make whether it is \$85 or \$150. These prices will have a huge influence on the portfolio.
  - BC Hydro is working through an update of the engineering and design and cost estimates are expected shortly.

### **Member comments regarding exports**

- A member questioned whether BC Hydro is examining a business case for export and whether it is objective. The member questioned whether the assessment is intended to be objective rather than BCHydro advocating for building for export.
  - BC Hydro response clarified that the Clean Energy Act says to assess the export market, develop rationale and protect ratepayers and that is what the BC Hydro assessment is doing and the intention is an objective assessment.
- A member further suggested that if it is an objective assessment, then that should be communicated to the public.

### **Member comments regarding the Load Forecast**

- One member questioned when the Load Forecast was going to be made available. It was clarified that it would be available by the end of February.
- It was clarified that BC Hydro will be reviewing the load forecast in the fall and reflecting any necessary changes; the forecast is relatively uncertain because of several large projects comprising the forecast.

### 3. DEMAND-SIDE MANAGEMENT RISK: John Duffy and Basil Stumborg

John Duffy briefly reviewed the key comments heard at the January meetings; including feedback that the language used to characterize risk was overly pessimistic; with Option 5 – uncertainty around assessment seemed overly harsh and; given the design of Option 5 that it wouldn't be implemented in that way as it was not realistic.

#### **Further member comments regarding DSM options and associated risk:**

- The unit costs of all DSM options are low compared to the reference price of new generation – it is less than half. What about DSM capturing a range but don't exceed \$124 a megawatt hour. There was a question as to how these options relate to the conservation potential review.
  - BC Hydro clarified that none of the options approach economic potential and might max out at \$60. All options include low cost and some high costs and all are co-mingled into an average of \$60. It is challenging to build options to exhaust options at \$100.

#### **Clarification points with Option 5:**

- Option 5 has the largest savings to start with however, following the risk assessment the mid probability curve is low relative to other options, which is related to measures of risk in that option falling flat. There are more aggressive rates structures in Option 5 needing government and BCUC approvals before implementation and this would push rate precedents. An example is a retro-fit for a building code and if over a certain point it triggers an intervention would government be willing to intervene and would BC Hydro be able to implement those savings? The mid probability line is lower than other options, and while it appears counter-intuitive essentially some of the measures are quite uncertain as to whether they would work.
- The options are intended to educate it was also discovered through the process of Option 5 that there could be serious consequences.
- BC Hydro agreed Option 5 probably would not be implemented and likely would take a different path and this informs analysis. If Option 5 works really well, aim for Option 4 and develop an action plan that combines both options and we have the flexibility to develop that.
- It was noted by BC Hydro that there is also a communication issue that if options are too aggressive this leads to negative consequences, which is the wrong message to send.
- Option 4 is the transition to societal shift and it is a staging process.

#### **Member comments regarding Option 5**

- One member commented that Option 5 is the most aggressive with the lowest expected return, and wondered whether BC Hydro can change the return.
- A member expressed concern that BC Hydro has designed a scenario (Option 5) that BC Hydro will never support because of the uncertainty so to create an aggressive option with high uncertainty means it will be a non-starter.
- A member commented that the purpose isn't to prove to the public that a wrongly desired DSM program is more aggressive.
- A member commented that the risk assessment is a technically flawed process as a static process of something that running out for 20-years. BC Hydro needs to redesign the modelling process and the dynamic part includes learning as the program progresses.
- A member commented that communication is really important and in the packaging there needs to be a very accurate description and trade-offs between options. From a learning perspective – either Option 4 is aggressive to what we know and Option 5 is aggressive about what we don't know and I think that we need

an Option 4.5 that is a combination and do some experimentation and increase various components and that is missing.

- There is Option 6 – design as you go along and educate as you go along (similar to option 4.5 above).
- One member commented with respect to Option 5 the underlying mechanics are good. From a communication piece point of view, from BC Hydro's perspective, uncertainties are broad and you need to communicate to government they have the ability to make decisions and it is not totally uncertain when it goes to the decision-makers.

### **ACTION ITEM(S)**

- BC Hydro will consider the possibility of creating a 6<sup>th</sup> option that encompasses attributes of both options 4 and 5; and if there is no new analysis, consider reflecting those thoughts in the results of the analysis and blending in components of options into resulting IRP actions.

### **4. FORT NELSON/HORN RIVER BASIN – John Rich**

The TAC received a power point presentation from John Rich, BC Hydro, on Fort Nelson and the Horn River Basin. The presentation provided the background to the current BC Hydro supply situation and Fort Nelson/Horn River Basin load requirements, identified the key challenges including the uncertainty of the Horn River Basin development potential considerations, industry supply choices and distances; preliminary findings were presented and finally the questions for the IRP analysis were considered.

#### **Points of clarification regarding Fort Nelson and Horn River Basin included:**

- The costs of going from 40 MW to 75 MW (current upgrade) is estimated at \$140M.
- There are compression requirements but not a lot at the well head. 60% – 75% of the work load is related to compression load at raw gas treatment stations spread throughout the Horn River basin and if carbon capture and storage (CGS) then it will be at the processing plant.
- It was confirmed there is expansion planned at the Spectra plant in Fort Nelson.
- The combustion of CO<sub>2</sub> at Horn River Basin could have a significant impact on provincial CO<sub>2</sub> goals.
- Regarding the Horn River Basin load, from an electrical energy stand-off of about 700 MW, it is large load and will use a lot of energy. To put that in context, a Kraft Mill is about 20 MW and a TMP ranges from 60 MW up to 100 MW.
- The Horn River Basin is approximately 500 km from a major point of the hydro system to a major point of the southern point of the Horn River Basin.
- Currently, Fort Nelson receives power from Alberta. Alberta will continue to provide service at postage stamp rates but if there is any incremental improvement BC Hydro will need to pay the full rate. If a preferred long term system upgrade includes reinforcing the wires for about \$300 million then that cost would all come to BC Hydro. Essentially supply from Alberta is not an option. Likely they would reinforce the wire to Edmonton so it would be a cheaper solution to improve on the B.C. side.
- The electrification project is in definition phase and rolling out all the aspects of a definition stage with some consultation – this is a two-year planning effort. Assume a two-year construction window with ballpark costs of between \$1.5 to \$2 billion and that includes the sub-transmission network within the Horn River Basin (approximately \$350 million).
- The price of electricity is a significant factor and will need to be compared with self-supply at imbedded cost rates.
- Currently rates are at 5-cents for industrial customers and in 10-years rates will be 10-cents plus and once rates are in the 10-12-cent range it could be that self-supply is equivalent to future prices.

- It was clarified for self supply, companies would use raw gas, so that likely they would not pay royalties however they would pay carbon tax.
- BC Hydro will be looking at the implications of various ranges of GHG forecasts on the supply equation.
- Regarding which GHG offset forecast where electrification of the northeast becomes economic is the mid GHG price forecast range.
- The analysis essentially refers to two distinct regions and they are moving at different paces. There is the Montney region around the Fort St. John area and we are already playing catch-up there. The Horn River Basin has slowed down and is more of a marginal player.
- Regarding wind projects being connected to a north east line, it is not thought that putting a wind load on the transmission line would be a problem, and that the line could handle the variability. It is a substantial line that is proposed.
- Electrification in the region essentially all hinges on future GHG liability. A higher carbon tax means the more likelihood companies will want electrical service from BC Hydro.

### 5. PORTFOLIO ANALYSIS/COMPARING PORTFOLIOS – Kathy Lee and Basil Stumborg

Kathy Lee continued the portfolio analysis slide presentations from Slide 141 to Slide 155. The intent of the presentations was to confirm the analysis approach and the appropriateness of the key issues for the IRP.

#### Points of clarification included:

- Regarding transmission adequacy, it was clarified that if BC Hydro doesn't have sufficient transmission capacity to export markets and during high water inflows and the large hydro reservoirs are full, then there may be a situation where BC Hydro must spill water. And there are many other factors, such as environmental factors, fish spills, etc. that all have to be taken into account; it is not just an economic factor that is considered.
- A TAC member raised a question about the benefits of implementing pumped storage projects and their contribution to meeting the self-sufficiency requirements.
  - BC Hydro responded that a pumped storage project that had an ability to provide annual water storage would increase the ability to absorb non-firm IPP freshet energy and rely upon it as a firm energy supply.
  - Post meeting note: the Clean Energy Act Section 10 has a prohibition on storage projects above a certain threshold and annual or multiyear storage are unlikely to be approved.
- By 2016 BC Hydro needs to be self-sufficient and up to that time there has been a reliance on market power/ non-firm large hydro energy. BC Hydro has relied on 2500 GWh of energy from the market but in 2016 this cannot be used in planning to meet load.
- B.C. is planning to purchase additional energy from IPPs to meet self-sufficiency by 2016 and because self-sufficiency requires planning for critical water from the heritage hydro system – about 4000 GWh per year is the expected surplus from the heritage hydro system.
- Regarding new incremental transmission; major new transmission circuits would not be available prior to 2020, however incrementally small requests throughout the system which could be available by 2016 or 2017 but there is uncertainty around those dates and timing.
- Regarding what other transmission reinforcements may be needed apart from the bulk transmission lines; the IRP analysis only examines high level transmission infrastructure.
- BC Hydro system is currently at 93% clean.

### **Member comments regarding adequate transmission to accommodate surplus**

- A member commented that all information presented is using average water levels as the base and BC Hydro needs to have the conversation with government to get the handle on the other end of the probability curve and for these numbers to accommodate a high level you will need at least 1500 MW of transmission to handle the high end probability case.
- Alternatively, a member commented that BC Hydro could find resources that can be shaped better, other resources that BC Hydro could ramp up and down.

### **Comments regarding meeting provincial GHG targets**

- With the respect to 2016 and Horn River it seems like the province will not meet established GHG targets.
- A member encouraged BC Hydro to acknowledge that there is a reasonable chance of missing government established GHG targets.

## **COMPARING PORTFOLIOS**

### **Points of clarification**

- With GHGs listed in the consequence table, this is referring to tracking emissions in portfolios which use gas to generate electricity. As well, GHGs are also reflected in costs.
- Regarding whether there would ever be stranded assets shown in the portfolios, with the portfolio optimizer, there would not be stranded assets in the analysis because the computer creates a perfect sequence of resource additions.
- BC Hydro is capturing expected avoided GHGs in the electrification scenarios. Scenario 2 has 80% reduction and within electrification there is a reduced certain percentage of GHGs. The basic premise is to get to the target level and GHGs are tracked.

### **Member comments on comparing portfolios**

- A member wanted to see rate impacts on more than a few select portfolios. One of the objectives of the Clean Energy Act is to maintain competitive rates. This member didn't know any other utility that wouldn't do a rate impact analysis.
- Another member commented that commercial customer groups couldn't understand Net Present Values of portfolios and all commercial businesses look at is where BC Hydro's rates are and getting to the point where self-generation makes sense. Cost per kilowatt hours would be a good proxy.
- One member wanted to see more information expressed on GHG (production and avoidance) with Electrification scenario as well as base analysis if possible.
- One member wondered about how spill risk was being assessed in the portfolio modelling and evaluation.
- One member stated there is uncertainty analysis undertaken on the demand side and this member was not clear on the supply side. This member suggested that not including uncertainty analysis on the supply side would seem like a gap.

## **ELECTRIFICATION**

### **Member comments on electrification**

- A member made a general point/comment that the objectives in the Clean Energy Act point toward affirmatively doing electrification projects and what makes sense from a GHG emission point-of-view. This member commented that there needs to be a metric to reduce GHG through electrification and then compare other electrification opportunities and parallel to that would be conservation review on electrification and metrics on what programs are acceptable and what aren't.
- It was commented that there is a difference between electrification by other actors on the load as distinct from hydro itself initiating electrification for GHG reductions.

- It was clarified that BC Hydro is working with the Climate Change Secretariat to develop something similar to an electrification potential review. BC Hydro is working with government on abatement curves to see how it fits together. It is uncertain how far it will get as the IRP gets finalized. Electrification sensitivities were proposed to take an initial high level review.
- Member thought that was a good idea and they would want to look at the most cost-efficient way of doing things.

### 6. WRAP UP AND ROUND TABLE – Anne Wilson

#### Points of discussion:

#### NEXT MEETING

- The analysis will be presented; Basil Stumborg will put together materials for the April meeting. The subgroup will meet and we set up a timeframe to talk about the scenarios to be considered.
- When asked if members wanted another half day, there was not an active uptake to the proposal and it was decided that the next meeting of the TAC will be April.

#### ROUND TABLE - CLOSING COMMENTS

- A member felt disappointed with the day and couldn't summarize the day.
- A member stated they found practical points raised today and it would be useful to have the results in advance of the April meeting.
- Looking for Site C cost estimates and export analysis as soon as possible.
- Disappointed about the DSM options and believes ways to improve exist. Glad to have the electrification discussion.
- Member noted there are information requests that are still outstanding specifically with reconciling import export data and that external people are using a different set of data and that is a receipt for miscommunication.
- Receiving material as far in advance as possible is important, today was a bit of struggle and expected it thought progress was made. This is sort of like a mystery novel aspect to this process and a few things came into place today.
- Member was happy with the day and glad to get some commitments. Interested to hear about Fort Nelson.
- One member wanted to see the Load Forecast document. Interested in seeing Site C information. Concurred about the value of the northeast gas information and it has been a good day.
- It was a good day and I have a better sense of how the IRP is unfolding and how inputs are fitting. Process – there were lots of interesting suggestions and wanting to see how BC Hydro will account for those conversations.
- There were lots of good ideas today and it was most enlightening particularly with the information around Fort Nelson.
- There was good discussion today. The more BC Hydro can facilitate this type of discussion the better. Forming the subgroup was an efficient use of time. It would be useful if Hydro is doing a course correction then to please get back to us with that information.
- BC Hydro member appreciated all efforts and comments. It is very helpful – the subgroup is an important thing and hopefully will address a lot of the issues. Liked the suggestion to contemplate on feedback and report back in writing or lead from at the next session. The next couple of months will be very busy and public consultation around the province takes place in March and portfolio analysis is also underway.

### **AREAS OF INTEREST**

- Handouts were circulated titled Members information Requests/Areas of Interest (matrix) and IRP TAC Members Areas of Interest.
- BC Hydro noted that with respect to the import export data and reference to the earlier comment about the difference in data sets BC Hydro has reviewed this discrepancy and the external folks account for downstream benefits in a way that BC Hydro doesn't. BC Hydro responded that it believes the data provided by BC Hydro is factually accurate and if the TAC member can provide why it is important the BC Hydro member would be interested.

### **NEXT MEETING DATES**

- TAC was advised that the next confirmed meeting dates are April 5 and April 6 and April 27 with a place holder for April 28.

### **CLOSURE**

- The meeting ended at 3:50 p.m.